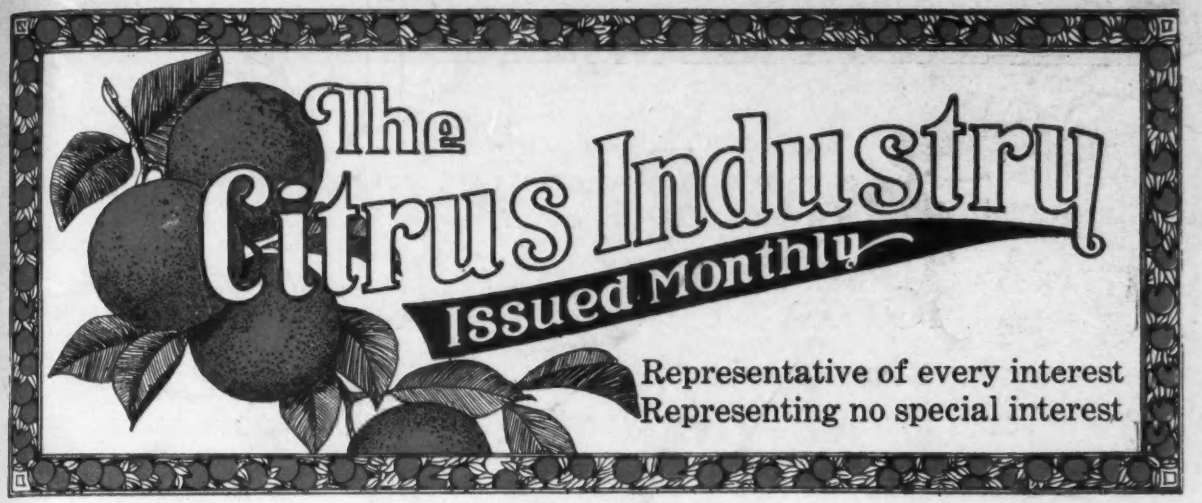

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Some Problems In Citrus Products Research

By Harry W. Von Loesecke

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Features In This Month's Issue

Unrefrigerated Brogdexed Oranges Shipped From California To New York.

Some Problems In Citrus Research Work
By Ralph W. Von Loesecke

Advances In Spraying Equipment
Continued From June Issue

The Growers Own Page
Need Organization And Advertising

Freight Rates On Citrus Fruits
By Marvin A. Brooker

Effect Of Lead Arsenate Insecticides On Orange Trees In Florida
Continued From May Issue

Citrus Dieback
By E. L. Lord

Soil Bacteriology
By Edward F. Kennan

Plan National Organization Of Citrus
Editorial

Impressions
By Frank Kay Anderson

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Some Problems In Citrus Products Research*

HARRY W. VON LOESECKE

U. S. Citrus Products Laboratory, Food Research Division Bureau of Chemistry and Soils. Winter Haven, Florida

Since January, 1932, the Citrus Products Station of the Bureau of Chemistry and Soils at Winter Haven, Florida, has been actively engaged in an investigation of the numerous and complex problems concerning the utilization of cull citrus fruits. The purpose of this paper is to briefly set forth the tentative results of some of this work, and to point out the big task confronting the chemist in this vast field where he can render his greatest service to both grower and canner. The pioneer chemical research of the United States Department of Agriculture carried out in California has to date saved the growers of that state a total of about seven million dollars by the utilization of material of a kind which formerly was wasted.

Canning of Orange Juice

During 1931-32 approximately 800 cans, 350 eight-ounce jars and 1300 bottles of orange juice were packed under various experimental processes. These packs were stored at temperatures of about 90°F and 40°F, samples being withdrawn from storage for analyses every three months. Brix, reducing sugars (as invert), non-reducing sugars (as sucrose), titratable acidity and pH were determined, for the literature gives no data concerning the changes in these constituents of canned orange juice during storage. Our results indicated that storage at temperatures around 90°F caused an increase in reducing sugars with a corresponding decrease in non-reducing sugars, and a slight increase in hydrogen ion concentration. These changes were not so marked in juice stored at 40°F.

Simple chemical analyses did not show the cause of the flavor changes taking place. These are so complex that more fundamental work must be undertaken before this question can be answered. It has, however, been known for some time that these changes are of at least three kinds: those due to living organisms, controlled by adequate pasteurization; those due to enzymes not yet fully understood; and those due to complex chemical reactions between the normal constituents of the juice.

The most successful experimental method for the preservation of orange juice by heat was found to be flash pasteurization. This was carried out by passing the juice through a silver coil surrounded by a bath of hot water, and then through a silver of similar design where the juice was cooled to the desired temperature for filling the containers. More recent improvements in technic have dispensed with the silver coil, and in its place a ribbon coil of tin tubing, whose walls were 2 millimeters apart, was used. The coil was mounted in a three-inch pipe provided with suitable inlets and outlets for steam and juice. With this equipment, temperatures above 212°F may be used, if necessary.

Temperatures of 70°-115°C (158-239°F) were used, but the lower temperatures introduce danger of microbial spoilage, whereas temperatures above 100°C (212°F) imparted an off flavor to the juice. The most favorable temperatures were found to be between 80° and 100°C (176-212°F), and the juice was held at this temperature for not more than 5 seconds. It was immediately cooled to 70°C (158°F) and put into the containers, previously sterilized, at this temperature. Filling the contain-

(Continued on page 8)

*Food Research Division Contribution No. 174.

Citrus Dieback

By E. L. LORD

The following observations are not intended to be in any way a complete study of this disease, but rather an extended comment on our present knowledge in its relation to grove practice.

J. H. Fowler presented at the Annual Meeting of the Florida Fruit Growers' Association in 1875 a very complete and intelligent analysis of this disease when we consider that it was written nearly sixty years ago. After describing the symptoms in the order of their appearance in the citrus tree (large and angular twigs, twisting and turning downwards, bark wrinkled and blistered, often splitting, sap exuding, and resinous gum collecting on the surface, leaves curling, twigs turning pale and dying, diseased clustered buds, top dying back) he calls attention to the fact that the orange tree is especially sensitive to conditions that do not affect other trees.

He then sums up the causes under the term "bad treatment". Most frequently the use of injurious fertilizers or the very bad use of good fertilizers. He was able to produce dieback experimentally by planting the tree in various organic fertilizers, such as cow manure, hen manure, night soil, composted fish or flesh, green cottonseed, and muck. He found that the danger was proportional to the amount of ammonia contained in the manure and the amount applied at any one time and in inverse proportion to the size of the tree and the distance of the tree from the applied manure. He believed that all organic manures were good for the orange tree, but that they should not be applied in the raw state, but composted and applied most heavily in the spaces between the trees and more thinly close to the tree. He warned against planting orange trees too deeply as dieback may follow because of the faulty aeration of the underlying soil. He criticised deep plowing and its tendency to produce dieback, stating that in good citrus soils the roots of the trees will meet in a year's time. Imperfect drainage is stated as a sure cause of the disease and the placing of a heavy mulch upon trees in low soils is given as a remedy. He believed the disease to be caused by a fungus, giving as his reason the following: ashes and lime tend to reduce it, it is more severe on wet soils, is associated with young trees, and similar diseases are known to be of fungoid origin. To avoid dieback, he recommended: avoid wet soil and "gallberry flats"; do not plant deeper in the ground than the tree grew in the nursery; compost organic fertilizer before applying; put nothing but ordinary soil in the holes or about the roots; when planting; cultivate lightly or mulch if practicable; apply ashes or lime in moderate quantities on the surface of the soil; in budding over large trees leave a portion of the top until the bud has reached sufficient size to care for the root.

In 1914 C. B. Lipman reported in Science on observations and experiments on several citrus soils which led him to believe that a poor nitrifying power of the soil with the ammonifying power remaining normal is the probable cause of dieback. Lipman found that wherever trees were suffering from dieback the soils had a very slight nitrifying power or none at all. Samples of these soils to which dried blood and sulphate of ammonia were added gave no increase of nitrates over the sterile soils after culture for a month at 26-28 degrees Centigrade. However, in these same soils ammoniation went on so rapidly as to give an intense odor of ammonia when the Petri dishes were opened. Much of Lipman's comments were theoretical, but the writer believes that the key to the problem of dieback lies in these experiments.

The most complete discussion of dieback has been given by Floyd in 1917. He states that it is uncommon on clay soils, being practically confined to sandy soils. Most prevalent in Florida but found in other parts of the world. Apparently neither infestious nor contagious. Cannot be recognized if the gum symptoms are: gum pockets, bark excrescences, stained terminals, multiple buds, and stained and splitting fruits. A disease of growing, not of mature tissues. He distinguishes between splitting of normal fruit and dieback fruit. As secondary symptoms he lists deep green foliage, frenching, abnormal leaves, s-shaped branches, and a rosette-like growth. The cause is given as unknown although he associates it with organic matter in the soil. He mentions hardpan and poorly drained soils, excessive cultivation, previous drouth conditions, light porus soils (spruce pine or dune soils), trees on the brow or base of slopes. He attributes most of the cases of dieback to the effect of nitrogenous fertilizers added to the soil and classifies the organic sources according to their activity in producing dieback. He states that mineral sources are not known to produce it even when used in excessive quantities. He states that lime and hard wood ashes are beneficial in some cases. Lipman's theory is rejected and he believes that the disease is caused by some organic compound or compounds obtained from the soil and that these compounds are formed under limited conditions. As preventive methods he recommends the following: ammonia starvation, stoppage of cultivation, mulching, drainage, liming, application of stable manure, breaking up of hardpan with dynamite, irrigation of dry soils, addition of bulky organic matter. For curative treatment he recommends bluestone applied to the soil or sprayed on as Bordeaux mixture. Application beneath the bark appears also to be effective in some cases, but he does not recommend it because of the trunk wounds and because of its uncertainty.

Lenfest (1922) recommends reduction of fertilizer, the use of bluestone, avoidance of cultivation, use of sufficient potash, at least half of the ammonia from slow acting sources, especially bone. Even application of fertilizer and bluestone is urged. He asserts that he can produce it more quickly with nitrate of soda than with any other fertilizer and that the amount of available ammonia which developed in the soil was the prevailing factor.

A modification or extension of Lipman's theory is suggested as the cause of dieback. Breazeale has shown that ammonium salts are more toxic than the intrates for the citrus tree, and it is possible that the citrus tree, like many other plants, is able to absorb ammonia directly when there is a deficiency of nitrates. The fact that dieback symptoms are only found in soils that are poorly drained, or that have a low nitrifying power, or that have a reaction which limits nitrification, points strongly to the theory that nitrification is involved. The

(Continued on next page)

THE GROWERS' OWN PAGE

This department is devoted to the growers, for their use in giving expression to their views and a discussion of growers' problems. Any grower is welcome to make use of this department for the discussion of topics of interest. The only requirements are that the articles must be on some subject of general interest, must be reasonably short and must be free from personalities. The editor assumes no responsibility for views expressed, nor does publication imply endorsement of the conclusions presented.

Need Organization And Advertising

Having recently returned to my Orlando home after spending the past six months in New Jersey, where I sold car loads of citrus fruit, through five retail stores I operated there, it may be of vital interest to the growers of Florida to know what the retail marketing conditions were in Philadelphia. These facts should be of particular interest to the growers who received nothing or very little for their fruit during the 1933 season.

Before leaving Orlando in December, I purchased from the Swope's grove two car loads of oranges at a cash price of $1.25 and $1.00 per field box F. O. B. grove, these eight hundred boxes combined with the fruit from my own grove were shipped to New Jersey in carload lots by truck transportation and the boat line. By shipping it in bulk, I eliminated six different charges which the average grower is confronted with, namely: washing and polishing, wrapping, grading, boxing and auctioneer's charge and commission to the distributor. As soon as this fruit arrived at its destination it was put in one-half bushel peach baskets and sold at $1.00 per one-half bushel which is equivalent to $4.00 per field box.

Much to my amazement, I found that the chain stores and other fruit dealers were selling fruit equally as cheaply and upon investigation I found that I could buy fruit from the auction market at a much lower figure than I could purchase it in Florida any pay transportation charges, even though the above charges were eliminated.

Therefore as soon as my fruit and the fruit which I had purchased direct was disposed of, I bought from the Philadelphia Auction terminals several hundred boxes of oranges and grapefruit of wonderful quality for a little over $2.00 per box and in many cases less than $2.00.

About the first of May I purchased many boxes of oranges as low as $1.25 for size 150, and grapefruit 54 in a box at $.90. Due to existing marketing conditions and the uncontrollable method in which fruit has been handled during the past season, I feel that it is certainly time for the growers to form an organization that will protect their interests. The transportation companies and the auction houses receive their charges, and why should the grower not demand an adequate return for his fruit, labor and efforts.

How much longer will the growers permit these deplorable conditions to exist.

I found that the general public is beginning to realize the real health value of Florida citrus fruit and I think with an advertising campaign combined with the production of quality fruit and proper marketing conditions the citrus industry can and should become the most profitable business in Florida. That will enhance grove values, and the business will will show an adequate return to all concerned.

R. W. ROGERS,
101 Lake Lucerne,
Orlando, Florida.

CITRUS DIEBACK

(Continued from preceeding page)

ability of copper sulphate when brought into the presence of ammonia in the plant to throw it out of solution thereby reducing the concentration and preventing toxic effects accounts completely for its effect on dieback trees.

The addition of organic matter to certain soils may bring about an increase in nitrification. The addition of lime may change the reaction of the soil so that nitrification may be increased or may reduce the toxicity of the ammonia. Gerretson gives the limiting acid reaction for nitrification as pH 3.9—4.5. Wakeman states that when ammonium sulphate is used as a source of nitrogen for nitrate formation and the reaction of the soil is acid to begin with there will be an increase of acidity in the absence of sufficient buffer or base, as a result of the formation of nitric acid from the ammonia and the accumulation of the residual sulfuric acid. Nitrate accumulation will proceed until the reaction of the soil has reached a pH of about 4.0. The amount of nitrate accumulated will depend upon the initial reaction of the soil and its buffer and base content.

Hall and his associates state that nitrate accumulation may take place under acid conditions if there is a quantity of calcium carbonate present, as nitrification takes place in the film surrounding the particles of lime. The addition of lime to acid soils has therefore a decided stimulating effect on nitrate formation. In alkaline soils deficient in humus, lime will liberate ammonia from ammonium salts, and this free ammonia will retard nitrification, although it may be taken up by the plant.

I have never seen dieback except on soils which have a definitely apparent low nitrifying power, nor have I seen it where the reaction was between 4.0 and 4.6 and the trees at the end of that period were showing fruit with a 90% splitting and all the other traditional symptoms of dieback. This same splitting has been completely stopped by lime applications while checks plainly showed an increase of dieback. All the cases of Valencia splitting (given as dieback symptoms by Fowler and Fawcett) which I have found have been on soils with a reaction more acid than 5.2.

Owen (1908) states that conditions promoting nitrate formation in soils are (1) temperature about 37.5 Centigrade (2) abundant supply of oxygen (3) proper moisture supply (4) a favorable reaction (pH greater than 4.6) (5) the presence of carbonates or other buffering agents and (6) the absence of large quantities of soluble organic matter in the soil.

Breazeale has shown that certain calcium salts are very satisfactory buffering substances to add to the soil solution. It is very noticeable that dieback disappears if calcium nitrate is used in a moderate quantity in fertilization. It is very evident that dieback is not found on soils having a high lime content.

In conclusion I believe that Lipman was right in claiming that die-

(Continued on page 26)

SOME PROBLEMS IN CITRUS PRODUCTS REASEARCH

(Continued from page 5)

ers at temperatures lower than this is not desirable because of danger of contamination. No spoilage that could be attributed to contamination by filling at this temperature ever took place. After being filled, the containers were immediately placed in a tank of water at 70°F.

Since some of the flavor changes taking place in canned orange juice are known to be due to oxidation, the juice was always deaerated before pasteurization. The deaeration equipment consisted of an inverted 12-liter flask within which was maintained a vacuum of between 27 and 28 inches. The juice was introduced through a small orifice into the flask, where, impinging on the bottom of the flask, it was spread in a thin film over the walls thus facilitating the removal of dissolved gases. Although it is not possible to remove all the gases, the method is beneficial. Juice containing 2.5 cc of dissolved gases per 100 cc of juice before deaeration, contained but 0.5 cc of dissolved gases per 100 cc of juice after deaeration. From the deaerating apparatus, the juice flowed in another 12-liter flask, also under a vacuum, acting as a storage receiver. The juice was forced through the pasteurizer by means of either nitrogen or carbon dioxide. In more recent experiments, the process was made continuous, the juice from the deaerator being pumped through the pasteurizer. The juice was thus exposed to the air for a maximum period of about two minutes.

The juice was extracted by cutting the fruit in half at right angles to the axis of growth and then reaming on a rapidly revolving conical, ribbed, burr. More recent experiments have utilized a slowly revolving (60 R. P. M.) burr, but the results of these tests are not yet available. Rapid burring is accompanied by considerable tearing of the fruit and the incorporation of air. Pressing the halved fruit over a perforated cone has also been tried. This incorporates some of the oil, which is detrimental because it may cause disagreeable turpentine-like flavors. Cold pressed orange oil has been deliberately added to processed orange juice, and juice so treated assumes an objectionable taste after a month. In comparison, juice to which partly deterpenated orange oil has been added did not develop this turpentine-like taste after one month; in fact, this oil improved the flavor of the pasteurized juice. Further tests with terpeneless orange oil are under way.

After reaming, the juice flowed through a slowly revolving monel metal 20-mesh screen, which separated the pulp from the juice. Other than this screen, no finisher was used, and the juice was immediately passed to the deaerator, previously described.

Juice from sound fruit, properly deaerated and pasteurized by a flash method at temperatures between 80° and 100°C (176-212°F) and stored at 40°F, at the end of nine months yielded a canned juice not greatly different from the fresh juice. The experiments clearly indicated that canned orange juice possessed by the method described could not be stored for long periods of time at temperatures as high as 90°F. Unfortunately, facilities were not available during 1931-32 for storage at temperatures between 40°F and 90°F.

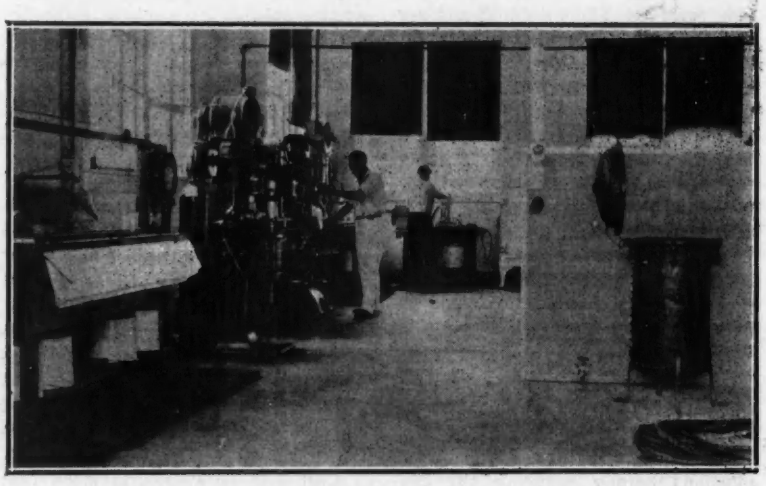
Orange juice processed in the same manner as grapefruit juice possessed a distinct "off" flavor immediately after processing. The disagreeable flavor was accentuated with storage at both room temperature and 40°F, the juice assuming a "curdled" appearance and becoming entirely unpalatable.

Darkening of Orange Juice Packed In Glass

It has been known for some time that the darkening of pasteurized orange juice at room temperature is due chiefly to oxidation. In none of our packs during 1931-32 was darkening apparent in juice stored in tin cans at temperatures of 90-100°F and 40°F. Packs in glass darkened when stored at these higher temperatures, the degree of darkening being greater in the containers with lacquered tops than in those of aluminum or tin and the tin being superior to aluminum in preventing darkening. When the jars were stored inverted, so that the juice was in intimate contact with the metallic cap, the differences were more noticeable. Light is probably not a factor, for the samples stored away from light darkened to the same degree as those stored in sunlight, the temperature of storage in both cases being approximately the same. When stored at 40° F none of the samples packed in glass darkened, regardless of the composition of the cap.

Darkening was not always accompanied by deterioration in flavor, nor was flavor deterioration necessarily accompanied by darkening.

Since darkening is due in great part to oxidation, the difference in color of the juices in containers with of small amounts of hydrogen through the action of the acid juice on the metal and the production of a reducing atmosphere. However, some of the packs stored at 90-100°F darkened while others failed to do so, this inconsistency being difficult to explain entirely on the theory of the production of a reducing atmosphere.



Partial View of the U. S. Citrus Products Station of the Bureau of Chemistry and Soils, Winter Haven, Florida

Orange Hearts

A few packs of orange hearts were undertaken. Lye peeling met with signal failure, the hearts being entirely tasteless. Packs were made for the most part in eight-ounce jars which were closed by means of a mechanical vacuum. Either orange lacquered, aluminum and tin caps may perhaps be due to the liberation

juice or sirup was added, the sirup yielding a better product. The packs were sterilized at 165°F for 35 minutes. After three months storage at 90-100°F, the sections became more or less leathery and deposits of hesperidin were apparent upon the sections, giving the impression of mold growth.

Concentrated Orange Juice

More recent experiments have resulted in the production of an orange concentrate. This was produced in 10-liter batches, concentrated under a vacuum of 27-28 inches, and at a temperature of about 40°C (104°F). Laboratory-scale operations required about six hours to concentrate the juice to a ratio of six to one. When diluted to its original strength by adding six parts of water to one part of concentrate, the product lacked the aroma and taste of the fresh juice. However, when an emulsion of cold-pressed orange oil was added to the concentrate in such amounts that when diluted to its original strength the resulting solution contained not more than .04% of oil, the product very nearly approached the taste of fresh orange juice. Whether the concentrate containing oil will keep for periods of nine months or more is a subject for further study. Some of the lots exhibited syneresis, the cause of which has not been fully explained.

Other Problems in the Preservation Of Orange Juice

There are still numerous problems confronting the chemist in his endeavors to can orange juice successfully; lack of space permits the mention of but a few of these. It is not yet known with certainty the maximum temperature at which canned juice may be stored without suffering marked deterioration in flavor. We do not know the exact nature of this deterioration in flavor, although there has been much speculation. The proper stage of maturity of fruit for canning and the optimum ratio of soluble solids to acids needs further study. Although the darkening of orange juice packed in glass is due chiefly to oxidation, there are other factors not yet fully understood. No satisfactory means has ever been found to prevent the settling of citrus juices, a phenomenon which is particularly unfavorable if the juices are packed in glass. Centrifuging is beneficial but is not an answer. Passing through a colloid mill, and the addition of so-called stabilizers have met with failure.

Canning of Grapefruit Juice

Although the majority of packs were made with orange juice, grapefruit juice was treated in the same manner as orange juice, namely by flash pasteurization. This yielded a better product than did exhausting, closing and subsequent sterilization. Certain lots of grapefruit, when canned, developed a peculiar sulfur-like odor, the cause of which has never been definitely determined, but variety may be a factor. Experiments have been started in which terpeneless grapefruit peel oil has been used to fortify the juice.

When stored under unfavorable conditions, grapefruit packed in glass is prone to the same darkening as orange juice.

TABLE I—CHEMICAL CHANGES IN PASTEURIZED CANNED ORANGE JUICE DURING STORAGE

	Reducing Sugars As Invert grms-100c		Non-Reducing Sugars As Sucrose grms-100c		Total Acidity As Anhydrous Citric Acid grms-100c		PH At 20 C		Brix At 17.5 C	
Storage Temp.	°F 90-100	°F 40	°F 90-100	°F 40	°F 90-100	°F 40	°F 90-100	°F 40	°F 90-100	°F 40
Fresh Juice	5.54	5.54	6.36	5.36	1.12	1.12	4.02	4.02	13.9	13.9
3 Months	7.22	5.39	3.49	4.48	1.12	1.09	3.90	4.00	12.0	13.6
6 Months	9.14	5.53	1.21	5.16	1.12	1.00	3.85	3.85	12.8	12.4
9 Months	9.41	4.90	1.21	4.88	1.12	1.02	3.62	3.80	13.4	12.8

Citrus Oils

Preliminary researches have been undertaken upon the production of essential oil from different varieties of grapefruit and oranges. After the juice has been extracted, the peel is passed through an oil machine (1), yielding an emulsion of oil and water. There is no satisfactory chemical method for breaking the emulsion, and the only satisfactory means is by high speed centrifuging. The yield of cold-pressed oil ranges from 1.5 to 5.0 ounces per field box, depending upon the variety of fruit. The oil thus obtained generally needs no further clarification and is known in commerce as "cold pressed" oil. The oil is somewhat prone to oxidation if exposed to the air for any considerable period of time, assuming a turpentine-like odor. This is caused by terpenes, which may be removed from the freshly prepared cold pressed oil by distillation in a vacuum. As the details for the preparation of terpeneless oils are held as trade secrets, investigations are under way in this laboratory to find feasible methods of preparing terpeneless orange and grapefruit oil.

After the cold-pressed oil is obtained, the residual peel still contains oil, which may be recovered by steam distillation. The crude, distilled oil is washed with a dilute solution of sodium carbonate and finally with water. Distilled oil is water white, and does not usually possess the aroma of the fruit from which it was obtained, and assumes a turpentine-like odor with greater rapidity than cold-pressed oil.

Little is known regarding the physical properties or the chemical composition of the oil from different varieties of Florida oranges and grapefruit. In 1916 Zoller (2) instigated researches on the composition of grapefruit oil, but did not extend his work to include different varieties. Poore (3) has recently completed a comprehensive study of the oil from California Valencia and Navel oranges.

Work will be undertaken to determine the chemical and physical properties of the oil from different varieties of Florida oranges and grapefruit.

Grapefruit Seed Oil

The easy availability of grapefruit seed from canneries suggests the desirability of finding a use for this waste material. Jamieson, Baughman and Gertler (4) have shown that the seeds contain about 30 percent oil and have investigated its chemical composition, classing it as a semi-drying oil.

Laboratory experiments have indicated that the crude oil, as pressed from the seeds, may be rendered palatable by treatment with sodium hydroxide and activated charcoal. Upon hydrogenation in the presence of a catalyst, the melting point of the oil may be raised so that it is solid at room temperature. Bubbling air through the oil at elevated temperatures increases the viscosity and also its drying properties. When treated with sulfur chloride, grapefruit seed oil yields a rubber substitute, similar to that obtained with cotton-seed and corn oils.

Investigations are contemplated upon the keeping qualities of grapefruit seed oil to see whether it is less prone to become rancid than other forms of cheap edible oils.

Lime Juice

Although the cultivation of limes in Florida is not extensive, it is probable that production will be greater in future years, and preliminary experimental packs of lime juice from different varieties of limes have been undertaken. Lime juice like orange

(Continued on page 20)

The Citrus Industry

with which is merged The Citrus Leaf

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PLAN NATIONAL ORGANIZATION OF CITRUS

Plans for a national organization of the citrus industry under the new agricultural adjustment act will be discussed at a meeting in Washington on July 20 of citrus factors from Florida, California, Texas and Arizona and other states producing citrus fruits.

Possibility that the American Fruit and Vegetable Shippers Association may be chosen as the vehicle for putting into effect such a national organization is expressed in some quarters. Such a step would seem to be logical and desirable as tending to harmonize the interests of the several states and the varied elements of the industry.

The proposed organization has the endorsement of the Florida Citrus Growers Clearing House Association, the Florida Citrus Exchange, the California Fruit Growers Exchange and leading factors in the Texas and Arizona fields. Delegates from all these organizations and others representing independent packers and shippers not affiliated with any of these organizations, will meet in Washington to confer with administrators of the act.

Delegates representing the Florida Citrus Exchange and the Florida Citrus Growers Clearing House Association have formulated suggestions for the set-up which will be presented at the Washington conference, and it is understood that California interests also have well defined plans which will be submitted. Texas interests also are understood to have similar suggestions which will be submitted to the federal authorities.

Among other things which it is hoped may be accomplished by the national organization will be the fixing of a minimum and maximum price for citrus fruits, more effective control of distribution and a standardization of grade and pack.

For many years there has been more or less desultory talk of a national organization of citrus growers and shippers, but up to this time it has been merely talk. The Citrus Industry from the time of its inception nearly fourteen years ago has consistently and persistently advocated a closer affiliation of growers and shippers in the citrus producing states. The idea has been well received in Texas where it is realized that Texas and Florida must act co-operatively in the handling of grapefruit if the growers of either state are to market their increasingly large crops with profit. But, actually, nothing has been done about it. So far as any effective control of the situation is concerned, we are just where we were fifteen years ago.

It has been pretty definitely demonstrated that no single organization and no single state can control distribution, regulate grade and pack or determine the price which the grower may receive for his crop. No Florida organization has been able to do it. Nor have the citrus organizations of California or Texas been able to accomplish it. While confined to but a few states, the industry is too big and too widely spread for any one state to handle.

The new agricultural adjustment act would seem to afford an opportunity for effective organization on a national scale upon which the growers of all citrus producing states may hope to unite to the benefit of all concerned. If the delegates from each of the interested states will go to Washington with the single purpose of effecting an organization to further the interests of the industry as a whole, and if they are given the support of the growers in the several states, there is hope that the growers of citrus fruits wherever located may look forward to reasonable profit in the future.

With such an organization functioning to stabilize price, control distribution, regulate grade and pack and stimulate the consumption of citrus fruits, the grower will be free to devote his time, attention and energies to the care of his groves and to the production of fruit which will meet the requirements of the trade. Without such an organization we may expect recurring periods of prosperity and depression, feast and famine, hope and fear—just as we have had such periods in the past.

All citrus growers will look forward with interest to the developments at the Washington conference, with the hope that the great minds in the industry may be able to evolve some plan for the solution of our marketing difficulties which will place the citrus industry on a par with other organized industries of the land.

GRAPEFRUIT

In 1931 Florida had in commercial plantings a total of 6,412,286 grapefruit trees. There has been no accurate count of grapefruit trees in the state since that time but plantings have been few and it is probable that the increase in the number of trees has been slight.

Statistics gathered in Texas up to April first, 1933, give a total of 6,390,522 grapefruit trees. Of this number only about one-third are five years old or over, and a comparatively small number are in full bearing.

When these five-year-old trees come into full bearing, and when the two-thirds of the present planting still under five years old come into full bearing, giving Texas as many trees as Florida now has, we are certainly going to need a national organization to control distribution and stabilize price if the growers of either state are to realize a profit.

IMPRESSIONS

By Frank Kay Anderson

From Sanford an indignant outburst from Karl Lehmann. "Ain't so what you wrote about me," he writes. In which case we are very glad to publish this correction. We take it that in reality he was sufficiently well acquainted with the lady in question, contrary to our first statement.

It is not a bit of trouble, really a pleasure, for this column to publish corrections.

That Latin "poetry" we quoted last issue seems to have floored our section of the reading public. Contrary to several expressed opinions we did not make it up. It is an outright and verbatim quotation taken from the book, Bill Nye and Boomerang, by the late Bill Nye. For the benefit of the younger generation Bill Nye was the first guy ever to get Calgary on a crystal set from Yonkers, N. Y. The old timers will recall that Boomerang was a Florida citrus grower journeying with Bill through the Mormon country.

A brief meeting in Sanford with Captain F. C. W. Kramer of Leesburg, one Lake County grower who by coincidence we haven't seen for a long time; and one with whom Time seems to be dealing most kindly. Looks just the same only a little more so; and still uses the same stance.

The appointment of Dr. H. R. Tolley of the University of California to head the fruits and vegetables division under the new federal Agricultural Readjustment Act came apparently as a wholesale surprise to Florida fruit and vegetable interests. Not much to be learned about him where we have circulated. If, however, he is the man responsible for the annual reports of the Gianninni Agricultural Foundation which we have read in the California Citrograph from time to time, he must be a very smart individual and unusually equipped for the job. In as much as Dr. Tolley's job in California has been at the head of that Foundation we take it he is the man who wrote those reports. Lots of knowledge, and plenty of horse sense, in those reports, and very clearly expressed. Somehow, too, we feel it is not at all bad to have in this new position one who has had such fine opportunity to observe at close hand the various fiascos in the governmental extravaganza concerned with the California grape deal. That effort, or series of efforts, cost the government many millions of dollars, broke a lot of banks and thousands of grape growers hearts, not to mention what it did to their financial equipment. A keen observer close to that deal may well be dubious of legislation calculated to make water run uphill.

Laws never can be a substitute for leadership.

In at a meeting in Sanford in the last week in June called by the Seminole Chamber of commerce to hear individuals connected with various industries tell of the information they had received in meetings with government representatives to organize industry-groups under the Industrial Recovery Act. Got a lot of information. Walter Haynes' report of the proposals for the Southeastern printing industry, of course, interested us much. Sounds reasonable, plausible and workable; and undoubtedly should be beneficial.

The report at this meeting of S. O. (Steve) Shinholser, the well known Sanford crate manufacturer was comprehensive, well given, and most informative. Our crate makers will come in line as a small section of the national body the government is organizing as the Wooden Package Manufacturers. What is outlined for them, and what apparently is due to happen to them, may be taken as indicative of what the various branches of manufacturing are due to have demanded of them. The government's interest, for the beginning at least, apparently is going to be confined to fixing minimum wages and maximum working hours, and seeing that these are fairly and strictly observed. If, however, these are held upon an identical basis in every factory of the same nature in a given region, there should be no handicap for any single manufacturer through these regulations.

Average of recent wage scales are due to be revised upward sharply and simultaneously. That means that things are going to cost more, but—How many oranges and grapefruit are likely to be purchased by a family the head of which is earning sixty cents to one dollar per day?

This newfangled stuff which sounds socialistic at first hearing doesn't seem socialistic after one has listened carefully. Instead, it seems to us that in the gradual upward march of business we have come to formulate, and to announce, a new philosophy of business. That is, as we would express it, when we put a man upon our payroll we must be concerned not only with his capacity for production, as we have always been, but in his capacity for consumption as well. That opens up a big field for constructive thinking by those possessed of some equipment with which to do the thinking.

And with the government, as seems to be intended, keeping its hands off of price-fixing all the old opportunities for individual initiative remain. That keeps the socialism out.

The inevitable result of attempted price-fixing, as Steve Shinholser pointed out, can only be that the producer of a superior article may be expected to get all the orders in that particular line and competitors will be choked out speedily, unless the government go into allocating orders and acting as a general sales agency for everything, which is manifestly unthinkable.

Following this new economic policy is, we believe, going to be productive of one thing which so far as we know no one has yet pointed out. It is going to produce a discrimination against the incapable or unfit laborer such as has existed at no

time in the past. A lot of misfits and incompetents are speedily due to be driftwood upon the shore of adversity, we believe. This new competition upon the basis of these new wage scales will effectually bar their employment. And then that will produce another situation giving much for those possessing thinking equipment to think about.

Getting back to that particular Agricultural Act which is the accompaniment of this industrial legislation, we are impressed by Mr. Secretary Wallace that it is intended as far as possible to coincide the production of crops to consumption. That is a big order. Big enough in the case of field crops; and in the case of orchard crops we believe is to be accomplished in years of large production or restricted consumption only by cutting off shipments at the bottom, leaving the low grade fruit at home. It seems reasonable to anticipate some such program, and we should not be surprised to read an announcement of it by the time these lines appear in print, or shortly afterward.

A pleasant visit with Randall Chase of Chase & Co., Sanford, and he brings up a new idea. That is, new to us. Gathering data from the Weather Bureau the Chase outfit initiated a check of that data with market data for the same years over a considerable period. From it this much may be deduced, years of good rains have produced good crops and those crops have sold well in the markets. In years of droughts or material shortage in rainfall the market prices for our crops have been unsatisfactory. This applies to both Florida citrus and vegetable crops. That, again, is something to think about.

A meeting in Orlando with Erle Wirt of Bartow, newly come to take a position with the Federal Land Bank of Columbia, which has opened a Florida office in the First National Bank building at Orlando in charge of A. O. Kay. We have not as yet met that gentleman, but his name certainly sounds O.K. And Erle Wirt confirms the news that the maximum loan to any citrus grower from this source will be $250 per acre, based upon a good bearing property with trees fifteen years old or older, and in prime condition. From this maximum the scale runs sharply downward. Despite this fact the government is looking for considerable borrowings from Florida citrus grove owners.

Visiting over a lot of subjects with Erle Wirt, and upon one point we find ourselves in profound agreement. That is the necessity right now for staunch and sound support by both growers and shippers for the Growers and Shippers League of Florida. This is one citrus undertaking which over the period of years of its existence has paid the growers and shippers, and paid them substantially. The various concessions it has wrung from the powers-that-be, not to mention the unfavorable proposals it has successfully fought off, would in any given season pay twenty times over the entire cost of maintaining the organization during the whole approximate ten years of its existence. Further we are agreed that it is right now just at the threshold of its greatest period of possible usefulness to the industry. Just at this time with so many things claiming attention there is definite danger of this being lost sight of.

We noted that Major General and Mrs. A. H. Blanding of Bartow about the first of June celebrated their Silver Wedding. That's fine, for there's a worthy young couple and we like to see them get along. Yeah? Well Friend Wife and ourself had our Silver Wedding anniversary last year. No, we didn't say anything about it. Sort of sneaked past it so to speak.

You see a number of our intimates began well in advance to indicate that any anniversary celebration we might hope to stage could only be expected to take the form of the formal extension of sympathy and commiseration for said Wife, with ourself participating in the entertainment about in the same capacity that the Horrible Example used to feature in temperance rallies when we were a youngster. So we talked her out of it.

The Blandings scored over us however when their older daughter was married two weeks ahead of the marraige of our only daughter in this same month of June last. But our daughter went further away from here to make her home. We-uns can be beat, but we won't stay beat.

And while Bartow is being mentioned, we want to say that one of the outstanding publicity jobs ever in the history of Florida is being done for the Florida exhibits at the Chicago world's fair, and entire credit goes to George Clements of Bartow. Florida's showing at the fair is good, don't let anyone fool you into thinking the kind remarks about it are all propaganda, but the manner and measure of the propaganda George is putting over to the country at large through the radio, the press and the movies is even more excellent than the exhibits he is boosting.

Many folks who have known George Clements around and about Bartow for the last ten years do not know that long before he came among us here in Florida he was a real feature in Big Time newspaper-making in this country. Bad health alone took him down from the high places and sent him for several years into banishment in the arid lands of western Texas and New Mexico. Recuperated just sufficiently to be about he became the key man for the Associated Press on the American expedition into Mexico after Villa. Floyd Gibbons then was a young squirt sent there by the Chicago Tribune. George was the dean and the boss of the newspaper correspondents on that job. Now Floyd Gibbons and several other young squirts of similar outstanding talent are bossing the job of getting publicity for the Century of Progress Exposition. When ideas run short they just can't help running to George. who never was short an idea in his life, and if he supplies them with something about Florida or the Florida exhibit how can California expect to do anything about it?

From George Clement's success in this instance is it too much to hope that Florida may draw a moral? Something to the effect that it pays big to pick real experts for jobs where experting is to be expected. The accepted Florida formula heretofore has been to put blacksmiths in publicity jobs, ministers to handling financial problems and bookkeepers to head selling enterprises when any public or semi-public undertaking has been in process of organization.

Harold Lyman Wall now of Chicago, but whom many will remember as a former member of the staff of THE CITRUS INDUSTRY for several years, just down here on a trip tells us the Florida exhibit is truly real good and something we can be proud of. He is an observing and keen critic, so his opinion is worth something, and is not just boosting praise. Next month we'll give you other stay-at-homes here with us the real low down, for our wife and son are at this writing in Chicago on attendance on the fair and expect to

(Continued on page 16)

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Now "poor spots" can be avoided by setting young trees in holes filled with FLORIDA PEAT HUMUS and giving them the very necessary humus to stimulate their early growth and put them into shape to utilize the fertilizer given them. "Poor spots" no longer are unavoidable.

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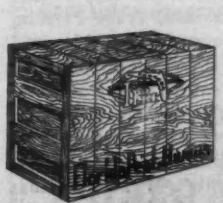

A trainload or a single bale.

Freight Rates On Citrus Fruits

MARVIN A. BROOKER

Associate Agricultural Economist, Florida Experiment Station

In general, freight rates on Florida citrus fruits are based upon distance from the point of origin to destination. Citra has a lower rate to the northern markets than has Leesburg; Leesburg has a rate advantage over Auburndale; and Auburndale has a lower rate than Arcadia. Likewise, the rate from any given point in Florida is lower to Cincinnati than to Indianapolis, and lower to Indianapolis than to Chicago.

In contrast to the structure of freight rates on Florida fruit, rates from all California shipping points are the same when the shipments are destined for the East. This postage stamp basis also applies to destinations. In other words, the rate from any point in California to any point from Denver to the Atlantic Seaboard is the same, regardless of distance. The same rate applies to New York as to Chicago, St. Louis or Omaha.

The minimum carload requirement for Florida is 32,400 pounds, or 360 boxes of 90 pounds. The minimum loading requirement for California is 36,000 pounds, or 462 boxes of 78 pounds.

In June, 1918, all freight rates in the United States were increased 25 percent. The second big increase became effective August 26, 1920, when the Interstate Commerce Commission granted increases to the carriers amounting to 33 1-3 percent on long distance shipments of citrus fruits.

The Interstate Commerce Commission began revising freight rates downward by ordering a 10 percent reduction in rates on all agricultural products effective January 1, 1922. A similar reduction of rates on non-agricultural products became effective July 1, 1922.

There were no other major adjustments in the rates from Florida between the base period and November 9, 1928, but the rates on California fruit underwent a further 10 percent decrease, effective December 3, 1923. They were also further reduced by the elimination of a terminal fee of 3 cents per 100 pounds which applied to shipments of California fruit to points east of the Hudson River prior to June 7, 1928.

On April 1, 1925, at the request of the Growers' and Shippers' League of Florida, the Railroad Commissioners of the State of Florida brought complaint before the Interstate Commerce Commission, alleging "that the rates on citrus fruits . . . in carloads, from all producing points in Florida to all markets and destinations in the United States and Canada are unjust and unreasonable, per se, and comparatively, in violation of Section 1 of the Interstate Commerce Act." As a result of the decision of the Commission in this case the Florida rates to points other than to New England were revised downward, effective November 9, 1928.

During the latter part of 1931 a large number of the railroads of the United States joined in an application to the Interstate Commerce Commission for permission to make a general increase of 15 percent in all freight rates. It was alleged by the carriers that earnings were not sufficient to meet operating expenses and fixed charges. This application was denied by the Commission, however, on the ground that low volume of traffic, rather than low rates, was the cause of the distress of the carriers, and that increased rates would result in still lower volume and thus defeat the purpose of the proposed increase. Certain emergency charges were allowed, however, amounting to 1 cent per 100 pounds on citrus fruits, effective January 4, 1932. This additional charge of 1 cent per 100 pounds applied to citrus shipments from all producing states, and was to expire on March 31, 1933. Before that date, however, the time was extended to September 30, 1933.

Beginning with January, 1932, there have been a number of important changes in the Florida rates, all of which have been temporary in nature. The emergency charge referred to above became effective on January 25, rates were reduced to points in Alabama, Florida, Georgia, North Carolina, South Carolina and Tennessee, to be effective through June 15, 1932. These rates were introduced in order to meet motor truck competition to these Southern states, but the purpose of the reduction was in part defeated by increasing the minimum car loading requirement from 32,400 pounds to 34,560 pounds. The amount of the reductions to these destinations was approximately 25 percent.

On February 22, 1932, temporary reductions were made in the rates to points in Northern Virginia and to Washington, Baltimore, Wilmington, Philadelphia, Trenton, New York, and neighboring cities taking the same rates. These rates were to expire on June 15, 1932, and did not apply from points on the Florida East Coast Railroad. On March 2, however, the Florida East Coast Railroad concurred in the reduction.

This reduction of the rates to Eastern cities was important from two points of view. In the first place a considerable saving in freight cost was made, since a large proportion of the shipments of Florida fruit goes to these markets. In the next place, this reduction represented an experiment with a blanket rate structure from Florida, since the same rates were made effective to all of the cities listed above. The minimum carload weight for shipments to this territory was increased to 39,960 pounds.

On the same date, February 22, 1932, rates to Boston were reduced, but the blanket rates to the other Eastern cities did not apply.

Both the reductions to the Southern states and to Eastern cities were made effective with the specific provision that they would expire June 15, 1932, unless sooner changed, cancelled or extended. They received no further amendment, so the original rates automatically became effective after June 15, 1932.

On October 23, 1932, reduced rates were again made effective to the Southern states. Reductions to Georgia points as far north as Atlanta, and to Southern Alabama and South Carolina amounted to approximately 27 percent. Reductions to North Carolina, Alabama and South Carolina, and to parts of Mississippi, Louisiana, Tennessee and North Carolina amounted to about 20 percent. On December 5, reductions of about 15 percent were extended to an additional territory to include cities as far distant as Memphis. All of these reductions were made effective for the purpose of meeting motor truck competition and were to expire on

January 31, 1933. Before that date, however, the effective period was extended to July 31, 1933.

In contrast with the practice of the previous season, the minimum carload requirement was reduced to 22,500 pounds when loaded into railroad owned box cars. In the case of refrigerator cars the minimum loading was again increased to 34,560 pounds.

Reduced rates to Eastern cities were made effective on April 1. Identical rates were introduced to Washington, Baltimore, Philadelphia and New York, and the rates to Boston were considerably reduced, but this market was not included in the blanket rates to the other four cities. The carload minimum weight was increase to 34,560 pounds.

Since all changes in the Florida rates beginning with January, 1932, have been of a temporary nature, in the absence of further changes the original rates will go into effect at the expiration of various periods. On July 1, 1933, rates to the Eastern cities will be the same as those prevailing before April 1. Original rates to the Southern states will become effective August 1, 1933. The emergency charge of 1 cent per 100 pounds will cease to be effective on October 1, 1933. At that time, unless there are further changes, the Florida rates will automatically return to the level of 1929, 1930 and 1931.

The rates from California remained unchanged from January 4, 1932, when the emergency charge of 1 cent per 100 pounds became effective, through April, 1933. On May 5, 1933, however, rates were reduced slightly more than 10 percent. Rates to Denver and nearby markets were reduced 25 percent and to markets as far east of Denver as Topeka, Kansas, 19 percent. To all other markets east to the Atlantic Seaboard, rates were reduced about 8 percent. The reductions to the groups of markets including Denver and Topeka will become the same as to other Eastern markets on January 1, 1934. The entire reduction will expire June 1, 1934, unless sooner changed, cancelled or extended.

From May 5 to June 30, 1933, the rates from California will be about 9 points lower than that of Florida. From that date until June 1, 1934, unless reductions are made in the Florida rates, the advantage in favor of California will be greater than at any time on our record, which extends back to 1900.

FORCES STRIVING TO BEAUTIFY STATE ARE HIGHLY COMMENDED

Gainesville, Fla.—The forces that have been striving for a more beautiful Florida were highly commended in a recent address by Prof. H. Harold Hume, assistant director of research with the Florida Experiment Station, and widely known writer and authority on sub-tropical horticulture. He was giving the last in a series of 41 radio talks especially to garden club members which were given by workers with the College of Agriculture and Experiment Station over the state station WRUF and three other radio stations.

"Beauty in our landscape, the removal of the unsightly, the making of good gardens, the development of beauty spots, the conservation of nature's great plant contributions to our state—these values can scarcely be over-estimated either in their esthetic aspects or in their financial values," Mr. Hume said. "These things have real value regardless of our attitude to them, and the sooner we awake to a full realization of this fact the better for the state. The great garden movement, the efforts of garden clubs, the interest of women's clubs, the work done by highway beautification organizations, and the efforts of everyone interested in Florida's natural beauty must be supported and advanced.

MARKET NEWS SERVICE TO BE CONTINUED ON GREATLY REDUCED BASIS

As previously stated by Secretary Wallace, the Federal economy program will limit the Department's expenditures very drastically during the fiscal year 1934. As a part of the process of adjusting the activities of the Department to this program it was announced that the Market News Service would be eliminated. Other adjustments within the Department, however, have made possible the continuance of the service on a reduced basis. The expenditure for this service during the fiscal year just closing was $1,300,000. It is expected that for the next year the expenditure will be $575,000. Information can be collected in many of the more important marketing centers and data as to the shipments can be supplied. The Department hopes that radio stations, newspapers, and States will take over most of the work of disseminating the information collected.

Under the greatly reduced program the Department plans to continue to collect the shipment and unload information on fruits and vegetables from the railroads and to maintain offices with a reduced personnel in Boston, New York, Philadelphia, Pittsburgh, Chicago, Cincinnati, Kansas City, and St. Louis.

The Department also expects to continue to operate about 30 temporary stations in important producing sections to place the service within reach of growers and shippers in highly concentrated fruit and vegetable producing districts. Forty-two offices of this kind are being conducted during the current fiscal year. Financial aid from States and local agencies will be expected in carrying on this part of the service.

The service on livestock, meats and wool will have to be limited to offices with a reduced personnel in Boston, New York City, Chicago, Kansas City, Omaha, St. Louis, Sioux City, St. Paul, Des Moines, Denver, San Francisco, Casper, Wyoming, and Ogden, Utah.

Some of the price-reporting and information-disseminating features of the service on dairy and poultry products will be eliminated. This service, on a reduced basis, will consist of compiling statistical data, mostly

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(Copperas)
Copper Sulphate
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Sulphur
Zinc Sulphate
Insect Powder
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We Can Supply You

Chase & Co.
Sanford, Florida

by mail, such as the monthly estimates of current production of butter, cheese, condensed and evaporated milk, dry milk, and also information regarding the output of commercial hatcheries and commercial egg breaking plants. It is planned to maintain a representative of this service in New York, Chicago, and San Francisco, and it is hoped that information as to the current movement of cold storage stocks can be obtained in several of the important markets.

The service on grain, hay, feeds and seeds will be greatly curtailed and limited chiefly to the collection of information on cash grain prices in a few markets, commercial grain stocks, and other general statistical information.

The leased wire system around which the market news service has been built must also be drastically curtailed. The reduced program, however, contemplates a wire extending from Boston to San Francisco and connecting 12 of the cities listed above.

DESTRUCTIVE TERMITES KILLED BY FUMIGATING WITH CALCIUM CYANIDE

Gainesville, Fla. — Termites are best controlled by fumigating with calcium cyanide, says J. R. Watson, head of the Entomology Department at the Florida Experiment Station.

The termites are easily recognized as dirty-white insects about ¼ inch long. They resemble ants, and are often called white ants. Their chief food is wood, thus they are quite destructive to dwellings and other buildings.

In using the cyanide, Mr. Watson suggests that one pound of cyanide be allowed for every 100 cubic feet of space beneath the building. He further suggests the stretching of paper from the sills to the ground, leaving an opening on each side through which to throw the cyanide. Wet the ground and then sprinkle the cyanide evenly over it. Close the openings, and the doors and windows on the first floor, and vacate the building for at least 24 hours. Before trying to reoccupy the building open up and allow it to air well. Remember that cyanide, as well as the gas it gives off, is extremely poisonous.

When only a few tunnels that termites have made are found in the floor, it is not advisable to fumigate, simply pour carbon bisulphate in the tunnels.

Termines prefer cool, damp, dark places; therefore, such places should be avoided as much as possible around the building. All rotting wood should be cleaned up in the vicinity of the building, and no wooden structure, such as fences or trellises, should extend from the ground to the wooden parts of the building. The building should be placed preferably on stone or concrete pillars.

IMPRESSIONS

(Continued from page 12)

stay there several weeks. We have asked them to write us fully and frankly.

We are glad to say something kind about Florida's worlds fair exhibit when it is deserved, for we are still sorer than a boil concerning that diorama depicting citrus, which is the only citrus feature of the main exhibit, aside from the orange juice sold there. With at least two real diorama artists in the state, whose work earlier attracted wide and most favorable attention, we do not yet understand why our commission in charge of forming that exhibit did not pick an expert, in the same manner that they chose a publicity man.

By the bye, the orange juice sold at the Florida exhibit is real fresh Florida Valencia juice, and the younger Theodore Strawn and his wife of DeLand, assisted by a Mr. Bielby whom we do not know, are doing the job. That is as it should be, yet for a time it looked as if canned orange juice was to be featured. Only threat of a revolution from a small group of growers staved that off. In all the world there's nothing better than the fresh juice of Florida Valencias, so that's putting our best foot forward.

Maybe you noted last issue, and maybe you didn't, that the editorial office of THE CITRUS INDUSTRY has been moved. Now at 312-313 Wallace S. Building, Tampa, where the one and only S. L. Frisbie may be inspected in person and observed at his heavy intellectual labors. Drop in and do that. In parentheses, the Wallace S. building is the one in which the Tampa Tribune is located. Colonel Wallace Stovall got Tampa so spotted with buildings to which his name is tied in one way or another that it is confusing not only to country people but to folks from Bowling Green too. Meantime, pardon us if a native craving for physical safety precludes our furnishing directions as to how we may be reached at our lair out in the country, but we get our mail at Altamonte Springs, and we answer, or do something with, even stub-pen letters.

In the lobby of the Angebilt hotel in Orlando we thought we heard an airplane. Looking about we discovered the Hon. J. J. Parrish of Titusville, head of the Nevins Fruit Co. etc. etc., seated upon a divan taking a little nap for himself right in mid-afternoon. We went over and woke him up, just to be pestful, but we did not chide him. Firstly we knew him still to be all worn out from the recent legislative session, secondly he had been reading a newspaper that is calculated to put an active and energetic person to sleep one hour after breakfast. Kidding aside, Jess Parrish certainly doesn't sleep during legislative sessions, and we expect to go right along for the rest of our life voting for and supporting him for the state senate from our district.

The numerous friends in Florida of William H. Baggs, Pittsburgh, vice-president and general manager of the American Fruit Growers Inc. will be grieved to learn that last month he lost his son Andy Baggs in an automobile accident in Pennsylvania, just about two years after the death of his other son, William, in an auto accident near Wenatchee, Washington. Two children, two sons, fine upstanding young men just beginning to pay real dividends upon their care and education, and both victims of the automobile within a relative few months. William was the victim of a grade-crossing accident with a locomotive. Andy's accident was most peculiar, standing ten feet or more distant from the road, in conversation upon the property of a farmer he had come to interview, he was struck by a fast moving truck which got out of control and left the road nearly opposite him.

In writing advertisers please mention The Citrus Industry.

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Also list wealthy residents of Florida.

W. L. Lamar
P. O. Box 333
JACKSONVILLE, FLA.

Effect of Lead Arsenate Insecticides on Orange Trees In Florida

(Concluded from May issue)

Change of pH of Orange Juice During Growth

The hydrogen-ion concentration was normally low when the fruit was small, but as the fruit grew the acid increased very rapidly. When the trees were treated with arsenic the change took place, but the acid content did not ever get so high as in untreated fruit. After the acid had reached its maximum it began to decrease, and on the trees that had been sprayed with arsenic the change was much more rapid than on those unsprayed.

Effect of Arsenic Not Systemic

It has been stated by other workers that the effect of arsenic on citrus trees was systemic. Gray and Ryan stated that arsenic affected the entire trees if only a part was sprayed. This was also the opinion of Juritz. Yothers reported that only the sprayed part of the tree was affected. In the present work the writers corroborated Yother's statement that the effect was not systemic, since all the data obtained were the result of spraying half-trees and using the unsprayed part as a check.

Relation Between Time Arsenical Spray Remained on Leaves and its Effect on Citrus Fruit

Juritz and Copeman have stated in their works that the effect of arsenic persisted for more than one year. All the work done by these men was carried on under arid conditions. Experiments conducted in Florida, where the rainfall is approximately 55 inches per year, showed that the effect also persisted for about the same length of time. Fruit from trees heavily sprayed in May showed the effect throughout their growing season and until the fruit was harvested 10 or 12 months later. Fruit from trees sprayed several times during the growing season showed only a slight effect 18 months after the last spraying. At the end of 2½ years, however, fruit from sprayed and unsprayed trees was identical.

It was found that when applications of arsenic were made to actively functioning leaves the effect was almost immediately shown in the fruit. When an application of lead arsenate was made to Lue Gim Gong oranges as late as September, an analysis made one and one-half months later showed that the acid was reduced to 89 per cent of normal as shown by the checks.

Summary

No noticeable effect on the fruit, tree, or undergrowth of a grapefruit tree was produced by 60 spray applications of one-half pound each of lead arsenate in 7½ gallons of water to the soil under the tree. The applications were made over a period of one and one-half years, and at the end of that time there were 2,000 parts of arsenic trioxide per million in the first 2 inches of soil, while only a trace was present in the leaves. Likewise, there was no effect on the fruit, tree, or undergrowth of an orange tree after 14 applications of one-half pound of lead arsenate each in 7½ gallons of water, even though there were 700 parts of arsenic trioxide per million in the first 2 inches of soil.

One year after the last application

WE'VE HAD ANOTHER SUCCESSFUL SEASON

. . . . *Thanks*

IN spite of a general reduction in growers' demand for all fertilizers in Florida, Genuine Humbolt Guano, Naconite, and Naco Brand Fertilizers have enjoyed wide distribution during this past season. The reasons, of course, are the unusually satisfactory results wherever these fertilizers have been used and the unexcelled service of our staff of trained field men. We suggest that you book your coming season's requirements now in anticipation of the increased fertilizer prices resulting from the Industrial Recovery Act, the industrial companion legislation of the Agricultural Adjustment Act which is expected to raise the prices of farm and grove products.

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Is probably the best all-around soil conditioner available today. It contains all elements, both common and rare, needed in an effective soil tonic.

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an analysis of the soil under the grapefruit tree was again made, and 1,800 parts per million was found in the first 2 inches of soil, and even at that time the tree, fruit, and undergrowth were normal.

When lead arsenate was sprayed on orange leaves a diminishing supply of water-soluble and insoluble arsenic was present for a year later. A tree sprayed with 8 pounds of lead arsenate per 200 gallons of sirup-sugar mixture had 0.34 mg of soluble arsenic as arsenic trioxide and 2.76 mg of insoluble arsenic on 10 g of green leaves immediately after spraying. At the end of six months the water-soluble arsenic had decreased to 0.005 mg and the insoluble to 0.19 mg.

An analysis of the wood, blossoms, and small fruit showed that arsenic was evidently translocated to these parts of the tree, for arsenic was present in quantities ranging from a trace to 6.9 mg of arsenic trioxide per kilogram of sample.

Soluble arsenic (measured as arsenic trioxide) present on leaves in quantities of 0.01 mg per 10 g of leaves stimulated respiration slightly, but when more than 1 mg was present on 10 g of leaves the respiration increase ranged from 50 to 75 per cent and the leaves usually fell.

When soluble arsenic was present at 0.01 mg of arsenic trioxide per 10 g of leaves the catalase activity was stimulated, but when quantities greater than this were present the catalase activity was decreased until, when as much as 1 to 10 mg was present, it was almost stopped.

When arsenic was present on the leaves, not so much acid formed in the fruit, and what was formed disappeared more rapidly than in the unsprayed fruit. When as much as 0.01 mg total arsenic trioxide was present on 10 g of green leaves at maturity, the maximum reduction without injury to the tree in fruit acid was produced. The hydrogen-ion concentration of fruit juice from trees that had been sprayed was much lower than that of juice from unsprayed trees.

The solids of fruit juice were somewhat increased when as little as 0.008 mg of arsenic trioxide was present, but when more than this quantity was present the solids were decreased. In this case also, approximately the same quantity of arsenic that stimulated the catalase activity caused the solids in the juice to be increased.

The ratio of acids to solids was very markedly affected by arsenic on the leaves. When as much as 0.01 mg of arsenic trioxide per 10 grams of leaves was present the ratio was only a little above normal, but a slight increase over this caused the ratio to rise to 20 to 1. When so much arsenic was present that the leaves dropped, the arsenic was eliminated from the tree and the fruit was less affected.

When the trees were sprayed seventeen times with 5 gallons per application a maximum of 0.16 mg of arsenic trioxide per liter of juice was found.

Experiments made by the writers have demonstrated that the effect of arsenic is not systemic, only the the sprayed part of a tree being affected.

The effect of spraying with arsenicals is shown almost immediately and persists to a slight degree for about 18 months. After 2½ years, however, it has entirely disappeared.

NEW POLICY ALLOWS CITRUS GROVE LOANS BE BASED ON VALUE

Henry Morgenthau, jr., Governor of the Farm Credit Administration, announced recently that decision had been reached on a new policy to be followed by the Federal Land Bank of Columbia, S. C., in making loans on citrus groves in Florida. The new policy has been decided upon to give effect to Section 41 of the Emergency Farm Mortgage Act of 1933, which provides that in making loans to owners of groves and orchards, the Federal Land Banks and other Government lending agencies "may, in appraising the property offered as security, give a reasonable and fair valuation to the fruit trees located upon and growing upon said property and constituting a substantial part of its value."

A memorandum of a recommendation made by Paul Bestor, Farm Loan Commissioner, drafted in consultation with Frank H. Daniel, President of the Federal Land Bank of Columbia, S. C., and approved by Governor Morgenthau, makes the following statement of policy with respect to loans from the Columbia bank to Florida citrus grove owners:

"(a) Loans may be made in favorable areas on the basis of approximately one-quarter of the commercial value, or one-third of the appraised value, given that the grove is being well maintained, is in good condition, is on soil adapted to the growing of trees and that the owner is a good moral and credit risk;

"(b) That on a good standard of conditions as under (a), loans of $200 per acre, running up to possibly $250 in exceptional cases, represent about maximum possibilities for land bank loans under terms of approximately fifteen years."

30,000 CANS FOODTUFFS SAVED FOR NEEDY IN PALM BEACH COUNTY

West Palm Beach, Fla. — More than 30,000 cans of foodstuff have been canned here during the last few months for distribution to the needy, reports Mrs. Edith Y. Barrus, home demonstration agent.

Two community canning centers have been in operation and have canned the surplus from nearby gardens and groves. The workers in these plants were first given several days instruction by the Home Demonstration Department, have also held five canning schools in different communities over the county. Special instruction was given in the canning of meats, vegetables, and fruits. "People in Palm Beach County are interested now as never before in canning the surplus and filling the home pantry," Mrs. Barrus says.

Brood sows should be kept on grazing crops and fed shorts and skimmilk so that they will give a good flow of milk.

Now is the time to plant successive plantings of zinnias, marigolds, portulaca, and other summer annuals for late summer bloom.

Let the insects and diseases fight it out in the citrus grove by introducing friendly fungi this summer.

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Soil Bacteriology

By EDWARD T. KENNAN, Frostproof, Fla.

Biochemistry is the action that occurs in the soil due to microbes known as bacteria, yeast and molds. Bacteria is the lowest form of life, a simple cell. They are plants, not animals. Bacteria being living matter is therefore a complex compound of the elements, carbon, oxygen, hydrogen, and generally sulphur and phosphorous together with other elements in the form of various salts or electrolites. These elements when taken as food become a part of living matter, so become living matter in themselves.

Shape, Size and Number

Bacteria are of several shapes. They are single spheres, spheres in pairs like coffee beans, spheres in a string like a string of beads, spheres in a bunch like grapes, spheres piled neatly together in stacks; rods, either straight or bent or twisted into a spiral, comma shaped, dumb-bell forms, short rods, long rods.

They vary in size, if we divide an inch into twenty-five thousand parts, two of these parts would equal the length of the average rod shaped vaccillus, (plural is vacilli). Yet the difference in size between the largest, which would equal about five of these parts and the smallest would be equal to the difference in size between a mouse and an elephant.

The number of bacteria per gram (a level teaspoon equals about 5 grams) of soil (about one twenty-eighth of an ounce) will vary through a wide range. There may be 45,000,000 or more in good soil where the conditions for their growth and reproduction is the best to only a few in acid sandy soils.

Bacteria reproduce themselves or multiply by dividing into like parts, each part then becomes a new parent cell which in turn divides into daughter cells and the process is repeated. This reproduction takes place about every twenty to thirty minutes depending upon variety and conditions. It is figured that the descendants of only one cell or bacturium would if nothing happened to interfere, with the rate of reproduction, weigh only one ounce in twenty-four hours but if this rate went on for only one week they would equal a mass as great as the earth, but things happen that interfere with this rate of multiplication. While bacteria are very sensitive in regard to all their environments and requirements, they are especially sensitive to different items depending upon the variety of the microbe. Some, (the aerobic) must have free oxygen while another form (anaerobic) cannot live in the presence of free oxygen. There are also the faculative ones that can adapt themselves to changed conditions. Practically all are killed at temperatures in excess of 180 degrees F. They all can withstand considerable cold and some survive for years in a frozen condition. The most favorable temperature for their activities is between 70 and 105 degrees F. There are some, but not many, that can live in an acid medium and some do well in alkalis but mostly they require a neutral medium. Bacteria are always found on the surface of fruit but never on the inside unless the fruit is injured.

Varieties

Bacteria are classified many ways, depending upon the study being made of them. For soil purpose we may classify them about as follows:

1. AMMONIFIERS, or those that break down complex organic matter. Under this head would came (A) Nitrifriers (nitrosomonas) or those that form nitrates from the nitrities. Nitrification ceases when the PH falls a little below 5.

2. DENTRIFIERS, or those that liberate or free nitrogen. These are soil robbers.

3. CELLULOUS decomposing bacteria or those that break down vegetable tissue to form various acid compounds.

4. THE NITROGEN FIXERS, these are two kinds, first the azotobacteria that take free nitrogen from the air and live free in soil and second the Rhizobium are those that fix free nitrogen in connection with legume plants. These microbes also form many soil acids and under goods conditions as to temperature, moisture, and energy material, can generate one and one-tenth their own weight of carbon dioxide in twenty-four hours.

A—Bacteria that make use of the simplest kind of foods or those that use inorganic materials for their foods are called PROTOTHROPIC. The nitrogen fixers come under this head.

B—Those that cause decay and putrification, that is, those that require dead organic matter for their food are called METATROPHIC. Among these are the ferments.

C—Those that require living organic matter, the disease producing microbes, are called PATHOGENIC.

Other names under which the varities may be recognized are:

(A) AUTOTROPHIC

(B) HETEROTROPHIC OR SAPROPHITES

(C) PARASITES

Like all living matter, bacteria are unable to live in their own waste product. Diseased bacteria give off a substance known as toxins. Some give off coloring matter. Some aromic matter, either pleasant of offensive. All give off a substance called enzime. This substance may be defined as a something that causes a chemical change without itself entering into the change. It might be well to mention here that it is not the work that the bacteria themselves do but it is what is accomplished through the action of their enzime that is so important. All living matter gives off these enzimes, in animals it is what is commonly known as such products as pepsin, et cetera. Enzimes are classified according to what they do. Some oxidize, some reduce, some split carbohydrates, fats and some pro-

(Continued on page 22)

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SOME PROBLEMS IN CITRUS PRODUCTS REASEARCH

(Continued from page 9)

juice is subject to deterioration in flavor. In lime juice, however, this "off" flavor is a distinct "turpentine-like" taste and is caused chiefly by an excess of lime oil. Packs which contained minimum quantities of oil were more palatable than the samples having significant amounts of oil. Of the varieties investigated (Key, Jamaica, Davis and Tahiti), the Tahiti yielded the best product.

Summary

After storage for nine months at 40°F, properly deaerated, flash-pasteurized orange juice from sound fruit possessed a taste and aroma not greatly different from that of fresh juice.

Storage of flash pasteurized orange juice at temperatures between 90 and 100°F caused an increase in reducing sugars (as invert) with a corresponding decrease in non-reducing sugars (as sucrose); and a slight increase in hydrogen ion concentration.

Orange juice could not be successfully packed by exhausting, closing and sterilizing in the same manner that grapefruit juice is now commercially processed.

Deaerated flash-pasteurized orange and grapefruit juice packed in glass darkened when stored at temperatures of around 90°F regardless of whether the caps were lacquered, tin or aluminum, but darkening was not so great in the presence of tin as in the presence of aluminum.

Darkening did not occur when the juice was stored at 40°F irrespective of the composition of the cap.

Darkening was not necessarily accompanied by deterioration in flavor, nor was deterioration in flavor always accompanied by darkening.

Orange hearts could not be prepared by lye peeling. When hand peeled, packed in a vacuum of 27-28 inches, and subsequently sterilized at 165°F for 35 minutes, the hearts became leathery after a short period of time.

A method of producing an orange concentrate of six to one, which, when fortified with orange oil and diluted to its original strength yields a product not unlike fresh juice has been described. Storage tests have not proceeded far enough to indicate the keeping qualities of the concentrate. Syneresis is liable to occur in such concentrates, the cause of which has not been fully explained.

Several samples of citrus oil from different varieties of oranges and grapefruit have been obtained. Further work on the investigation of their chemical and physical properties, as well as a feasible method for the preparation of terpeneless oils, is under way.

Preliminary studies have been made on the chemical properties of grapefruit seed oil.

Juice from different varieties of limes has been packed in the same manner as orange juice. Lime juice is subject to deterioration in flavor, the juice assuming a turpentine-like taste, especially if lime oil is present.

Acknowledgment

The kindness of the American Can Company, and the Crown Cork and Seal Company, for the loan of their machines, and the cooperation of Mr. Karl L. Ford, Technical Advisor of the Glass Containers Association for furnishing the eight-ounce jars is greatly appreciated. To Mr. Wilbur A. Pipkin and J. J. R. Bristow of the By-Products Sales and Manufacturing Corporation at Tampa, Florida, we extend our appreciation for their kindness and cooperation in permitting us the use of the machine for cold-pressed citrus oils.

Literature Cited

1. U. S. Pat. 1,798,555, March 31, 1931.

2. Zoller, H. F. Journ. Ind. Eng. Chem. 10 p 364 (1918).

3. Poore, H. D., U. S. Dept. Agr. Techn. Bull. 341, March 1932.

4. Jameson, G. S., Baughman, W. F. and Gertler, S. I., Oil and Fat Ind., 7 p 181 (1930).

RURAL COMMON SENSE

By Spuds Johnson

Balanced Production In Farming Should Accompany Inflation

Inflation alone will not restore pre-war purchasing power to the over-produced farm commodities — cotton, wheat, corn, hogs, rice, and tobacco. This opinion is expressed by officials of the United States Department of Agriculture in commenting upon recent increases in the prices of farm commodities.

Inflation ordinarily gives farmers certain definite advantages. Such measures, designed to raise prices, raise the prices of raw materials first, and farmers are primarily producers of raw materials. Inflation may help general business conditions and improve the demand for farm goods as well as increase their prices. It reduces the relative size of fixed charges, such as debts and interest, that farmers must pay.

But the present farm problem rests upon a fundamental lack of balance between the production of actual agricultural goods and the consumption of those goods. American farmers are producing too much wheat, pork, cotton, and other commodities under the conditions that now prevail.

Normally farmers do gain by inflation, but the presence now of these surpluses prevents them from gaining the full measure of benefit.

Higher prices caused by inflation alone may tend to increase production, and to intensify the actual maladjustment between production and effective demand.

Desirable as a rise in the general price level is, under existing conditions it must be accompanied by production control unless and until normal markets are restored.

Farmers must look past the benefits of inflation toward the real essential adjustment to economic reality—the adjustment of the volume of output of American farms to the actual need, coupled with ability to pay, of the people who will consume that output.

MERITS OF FLORIDA'S TROPICAL FRUITS NEED BE MORE WIDELY KNOWN

(Continued from preceeding page)

contain a white, milky juice or latex which in turn contains an enzyme that aids in digestion. This enzyme is called papain. It is not present in the fully mature fruit. Long ago natives of tropical countries where papayas are grown found that rubbing tough meat with a slice of green papaya fruit made the meat tender. They also used the latex in the treatment of various diseases and digestive troubles.

A recent bulletin by the Florida Experiment Station states that Florida avocados may be an ideal food for people troubled with diabetes.

The total sugar content of the avocado is low, compared with other fruits, the sugar content of Florida avocados being lower than that of these fruits grown in more arid climates. This fruit is an excellent food.

There are many other delicious tropical fruits growing in Florida on a smaller scale. Florida's tropical fruits which have real merit should be given more widespread promotion, and these fruits would add more than they now do to the income of the state.

If baked potatoes are slit or pricked as soon as they are cooked, they are not likely to be soggy.

Unrefrigerated Brogdexed Oranges Shipped From California To New York

Florida citrus growers and shippers will be interested in the following news items taken from the Pomona, Cal., Progress-Bulletin, and from a later dispatch from Los Angeles. The quotation from the Progress-Bulletin was written following the initial shipment of unrefrigerated Brogdexed oranges from California to New York and the dispatch from Los Angeles tells of the second such shipment:

Pomona Progress-Bulletin, June 23

Success of a new venture in citrus shipments now being inaugurated by the Brogdex Company of Pomona, and of special importance to growers in Pomona valley because it is prophetic of a revolution in intercoastal transportation, was revealed today by officials of the company, who also confirmed reports that a minimum of 75,000 boxes of Brogdexed valencia oranges will be shipped from Los Angeles harbor to New York during the next two months aboard 10 express freighters of the Luckenbach lines.

Announcement was made of the successful completion last Tuesday of the transportation to New York of 7,500 boxes of oranges in ordinary stowage under special ventilating conditions by the Luckenbach express freighter Robert Luckenbach.

The shipment is revoluntary in several respects. In the past, it has always been necessary to place such cargoes under refrigeration at low temperatures if the haul was to be long and thru adverse climatic conditions.

Needs No Refrigeration

By far the bulk of the movement of citrus to the Atlantic seaboard has been by rail, there being but few vessels with refrigeration space operating in the intercoastal trade, but if future ordinary stowage water shipments are as successful as the one here mentioned, a large part of the citrus tonnage may be diverted to the water carriers, it was stated.

Special air conditioning of space in the ships permits fruits processed by the Brogdex system to keep as well during transit as has heretofore been accomplished by refrigeration, it was stated.

The fruit is being packed in special containers which may be used repeatedly, the fruit being repacked in the eastern markets probably in consumer packages. This is expected to result in a considerable saving in packing, refrigeration and transportation costs. Furthermore, it is expected that this will permit the shippers to pay a greater return to the growers.

Open N. Y. Headquarters

The Brogdex company in anticipation of continuation of this form of shipping, has set up headquarters in New York City for the repacking and distribution of fruit shipped in this manner from all parts of Southern California.

Several officers and local employes of the company have been transferred to the New York headquarters, including E. M. Brogden, vice-president who is inventor of the Brogdex process and who has worked out this new method of shipment.

R. L. Knox, former manager of the San Antonio Fruit exchange, who was named general manager of the Brogdex company last fall is now in New York but is expected to return early next week to arrange for further shipments which are expected to go forward on a five-day schedule during the balance of the valencia season.

Install System on Ships

Two members of the engineering staff of the Brogdex company are now in Seattle supervising the equiping of the air conditioning system aboard the Luckenbach ships.

It is expected that other large intercoastal lines will soon have ships available for transportating California's citrus fruits under this new transportation method. It is also planned to have a steady flow of fruit moving under this new plan in quantities that will not glut the market.

Second Shipment Made

Los Angeles, July 2.—Dipped in paraffin by a revolutionary process the first of ten scheduled shipments of 7,500 cases of oranges left Los Angeles harbor yesterday for New York aboard the steamer Dorothy Luckenbach in ordinary dry storage for the first time in the history of intercoastal shipping.

Luckenbach officials completed an experimental shipment of 6,000 cases of the specially coated fruit last week on the Robert Luckenbach at the instance of the Brodgex company of Pomona, Calif., developers of the paraffine process.

Success of the experimental venture to the scheduling of ten shipments of a minimum of 7,500 cases each of Valencias, all to be sent in ordinary dry holds.

Heretofore oranges have always been shipped to the East Coast in refrigerated holds or in cooled-air ventilated stowage. Because of the cost of water transportation under these conditions the bulk of the citrus movement to the East has been by rail.

Shippers and executives of the processing company believe that increased economies of the paraffin method of shipping will so reduce the overhead cost and therefore the market price of the fruit in New York that an increased demand for it will be inevitable.

According to E. A. McMahan, Luckenbach district manager at Los Angeles, the line is prepared to ship as many as 100,000 cases of oranges a ship, if necessary.

MERITS OF FLORIDA'S TROPICAL FRUITS NEED BE MORE WIDELY KNOWN

By Spuds Johnson

Florida has a wealth of tropical fruits, but with the exception of citrus, not many of them are receiving the promotional attention they deserve. Slowly but gradually many of them are gaining footholds in the markets of the country, in spite of the fact that their sale is not being pushed as it should be. They are contributing to the aggregate farm income of Florida, and could be made to contribute more generously.

Many of these tropical fruits have properties or characteristics which make them especially desirable. The mango is to the tropical countries of the world what the apple is to the temperate countries. It will prevent scurvy. It is useful as a food, in making ice cream and other dishes.

The guava, so common throughout a large part of the southern half of Florida, is one of the best jelly making fruits known. The balance between acid and pectin is such that sugar to three or four times the weight of the juice may be added.

Papaya plants and immature fruits

(Continued on next page)

SOIL BACTERIOLOGY

(Continued from page 19)

teins. It is the enzimes that form the nitrates from the nitrites and nitrites from the ammonia.

Starting from any point as living matter, that is, protein or protoplasm, a nitrogen atom may take the following course: When the protein is consumed by a living body such as plant or animal, we will say here a cow, urea is one of the compounds given off. It is acted upon by an enzime of a bacteria and broken down into compounds of which ammonia is one. This ammonia is further reduced by another enzime and so until nitrogen is formed which unites with a base like calcium and this calcium nitrate is taken up by a plant of some kind and goes into protein. This protein in the plant is eaten, say by another cow, and the cycle completed. If the cow dies the Saprohlic or rotting bacteria act on the protein to form, first Proeosis, next Peptones, then Amino Acids and finally into Ammonia and the cycle completes.

Bacteria act upon phosphorous, potassium, sulphur, calcium and other compounds, and soil minerals to put them in forms that plants can use. These items are in the main inorganic compounds and as such are not available to the plants as such. Bacteria by liberating carbon dioxide, ammonia, hydrogen sulfide, acids and so, liberate the elements and thus make them available for the use of the higher plants.

Yeast and Molds

Other forms of microscopic life in soil include yeasts and molds. Yeasts, like bacteria, are one cell organisms. They are as a rule larger than bacteria. They reproduce by throwing off buds like small potatoes attached to larger potatoes—these buds separate from the parent cell and become parents in turn.

Molds differ from yeasts in being composed of more than one cell. They consist of a net work or web of hair-like matter producing from the central body and these hair-like arms throw off buds which become the main body of a new being.

Yeasts and molds flourish under slightly acid conditions. Bacteria prefer neutral conditions. It is due to molds that large part of our nitrates are formed in our acid sandy soil.

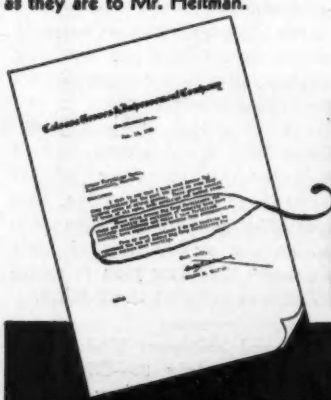
SPORS—Under adverse conditions bacteria, yeast and molds have the power of concentrating themselves into smaller spaces and while in this condition (spore stage) may survive under conditions of high temperature and lack of moisture, however, when

Gilmer M. Heitman tells:
His Experience

"Yield, Quality and Earliness of Maturity have been Entirely Satisfactory"

WHAT Gilmer M. Heitman, President and Treasurer of the Caloosa Groves & Improvement Company, Fort Myers, Florida, has to say about Armour's BIG CROP Fertilizers is the strongest possible recommendation a grower can make for its use. As a basis for his statement he gives his experience on more than four hundred acres of citrus groves---trees of all ages---both seedlings and budded stock---and he says that from experience he would not hesitate to recommend most heartily the use of Armour's BIG CROP Fertilizers. Consider his experience in making your own fertilizer selection and remember that yield, quality and earliness of maturity are just as important to you as they are to Mr. Heitman.

The letter reproduced here is typical of many similar expressions from a large number of Florida's most successful growers. Such letters show the experience of growers in practically every section of Florida and indicate the importance of proper fertilization. While citrus growing calls for real agricultural and horticultural skill, a large part of the battle is won when you select and use the right fertilizers. Armour's BIG CROP Fertilizers are manufactured with that idea clearly in view and from actual use their value has been recognized by countless growers in Florida. Use Armour's BIG CROP Fertilizers this year and learn from your own experience how they help to produce better crops. There is a special grade for the exacting needs of your trees. See your nearest dealer today or let us send a Field Representative to consult with you.



Since using Armour's BIG CROP Fertilizers the yield and quality and earliness of maturity have been entirely satisfactory and while I have fertilized heavily, have experienced no trouble from ammoniation. From my past experience I do not hesitate to recommend Armour's BIG CROP Fertilizers for citrus culture most heartily.

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this adverse condition has been removed the normal function and life of the cell is again renewed. The cell (bacteria) normally consists of from 70 to 90% water. While in the spor stage this water is dissipated and they surround themselves with a tough resistant coat. In this respect this form or organism resembles the seeds of higher plants, hence the name spor.

Conditions Favorable To Bacteria Activity.

I was asked to talk tonight on the effect that cultivation has on the bacteria of the soil. This is a subject that is so complex that I hardly know what to say, but now that we know something about bacteria and their life cycle we can picture what happens to them when we cultivate. First off, cultivation carries aid down into the soil. Bacteria require large amounts of air from this standpoint cultivation is beneficial. However, in our sandy soil it is usual that it be porous and probably air enough is already there. Next, perhaps by cultivating, we can bring up some of the sub-soil moisture during dry periods and thus supply moisture to the bacteria in the root area. Again in wet weather the moisture may be excessive and cultivation will allow it to dry out. Bacteria do best in soils when the moisture is equivalent to about 60% of the water holding capacity of the soil

If we have a good sod there is hardly anything to be gained by cultivating. A sod soil is well aerated and holds more moisture. The roots of the growing plants are acting as a cultivator and keeping the soil open to air.

If we are growing a good cover crop it is well to knock it down during dry weather but not necessary to work it in. From the bacteriological point of view it is just as well to let it rot on top as underneath. However, it rots as a rule faster when worked in than it does lying on top. This is due mostly to the fact that it is more moist underneath than exposed to the heat of the sun while on top. If our soil is contaminated with toxins it would be better then to let it remain on top and the product of decay would eventually free the soil of the poisons if other items were satisfactory.

As the quality of the organic matter is of greater importance than the quantity we can look upon harrowing the soil from this angle. Young succulent green matter is less resis-

(Continued on page 26)

JACKSONVILLE

3 GOOD HOTELS

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$1

Rich, Ripe, Old Fashioned Leaf

Our Old Kentucky Homespun and Burley is no more like manufactured tobacco than day is like night—guaranteed free from chemicals and all other adulterations that conceal imperfections, delude the sense of taste and undermine the health.

We use the same method our grandfathers used in preparing tobacco for their own use—every trace of harshness leaves it—nothing to "bite" your tongue or parch your taste. Thousands of tobacco lovers the world over swear by its inimitable smoking and chewing qualities.

REDUCE YOUR TOBACCO BILL ½ We sell direct from the grower, this eliminates the eighteen cents a pound Revenue Tax—all manufacturers' and middlemen's profit, thereby effecting a saving to you of 50% or more. No fancy packages, no decorations, just quality and lots of it.

MONEY SAVING PRICE

SMOKING 5 lbs. OR for CHEWING $1.00 Send us One Dollar Cash P. O. or Express Money Order (no personal checks) and we will promptly ship you a five pound package.

Five pounds of Old Kentucky Homespun and Burley will make 40 large packages of smoking or 50 twists of chewing.

35c Send 35 cents in silver and we will ship Post Paid — one pound package as a trial offer. A trial will convince you.

We have thousands of requests daily for "Samples"—our margin of profit is so small we cannot comply with these requests.

We do not ship C. O. D. orders, to do so would require a large staff of clerks. Orders must be in English language.

CHAOTE—DORAN
Independent Tobacco Growers Association
FRANKFORT, KY.

Advances In Spraying Equipment

(Concluded from July issue)

A newer development in truck hauling is represented by the dual drive, six wheel outfits. Effective tractive effort in loose sandy soils is stepped up enormously. These outfits offer a distinct possibility as grove trucks for handling heavy, large capacity spray equipment row by row or any other way. They are giving an excellent account of themselves in taking fruit directly from the grove without any intermediate handling.

Weight and power we have had for several years, in both trucks and tractor units but until recently the method of applying this power has received little consideration. The actual results already secured in field operation indicates that in the method of applying lies the solution.

Spray Pump

Since we have assurance of being able to get through the grove with High Pressure Sprayers of large capacity we are fully justified in considering the types available and the best method of operating them.

NOZZLE DISCHARGE — GALLONS PER MINUTE

FOG DRIVE GUNS using 6 hole whirl plate				Adjustable Gun using 4 slot type whirl plate.		Solid stream gun using no whirl plate		
Disc openings and size No.	.0465 No. 56	.0635 No. 52	.0781 5-64	.0635 No. 52	.078 No. 47	5-32	3-16	7-32
Pressures	GPM	GPM	GPM	GPM	GPM	GPM	GPM	GPM
300 lbs.	.90	1.37	1.80	1.07	1.32	10.0	13.7	18.7
350 lbs.	.96	1.48	1.93					
400 lbs.	1.03	1.58	2.05	1.27	1.59	11.3	16.2	20.6
500 lbs.	1.15	1.78	2.27	1.48	1.82	12.0	18.2	21.1
4 nozzle broom @ 500 lbs.	4.60	7.12	9.08	5.72	7.28	48.0	72.8	84.4

PUMP INFORMATION

	Pump No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Cylinder size	4 Cyl 2½x2½	4 Cyl 3¼x4	3 Cyl 2¾x4	3 Cyl 3¼x4	3 Cyl 3x3½	3 Cyl 2¼x
Gallons per min.	20	43	45	35	35	34
Power needed	12	20	20	15	15	15
Speed of Pump	60-120	100		75	120	80
Pressures	400	500	800	500	500	400
Bearings	Plain	Timken	Ball & Roller	Timken	Plain	Timken
Weight	680				800	450

The Pump

Increased capacity and reserve pressure are demanded of present spray machines. If we contrast the best of the outfits available today with those of a few years ago we find the following points incorporated:

Pressures have increased from 300 pounds to 700 or even better.

Pump capacity has been stepped up from 10 to 12 gallons per minute to 30 gallons and even better.

The pumps speed have tended to increase from an average of about 50-60 to as high as 120 rpm or better.

With the increase in pump speed bearings have been changed at vital points from plain to roller and ball bearings.

The cylinder size has remained about the same with a tendency to smaller cylinders rater than larger. 3¼"x4" being the largest.

The number of cylinders have remained the same, three or four being used in all makes.

Porcelain lining is used in all types, though brass lining is supplied as regular equipment in some makes.

A careful comparison shows that some of the manufacturers have devoted much thought and care to their latest models, with the idea of producing a machine of ample reserve capacity, free from up-keep expense, of long and effective life and as light as experience and use of stronger metal alloys such as chrome nickle iron would permit. These pumps are really precision built machines and largely eliminate the usual tinkering job of replacing plunger cups, valve gaskets, valve seat, etc.

The outstanding features of our spray pumps are reliability and consistent performance. It is a pleasure to use them.

Rods, Guns, Brooms

The value of high pressure, large capacity outfits lies altogether in the speed of application and acreage covered. They have got to move. The old bamboo rods did and still do splendid work but they are slow. The one or two nozzle guns stepped up the time but coincident with their development, injury to foliage became common.

In spite of the danger of injury from the force of application of the spray material the gun has developed into an efficient tool.

Its success depends in the user being able to spray fast and consequently any nozzle clogging was more serious than had previously been the case. To avoid this, larger disc openings were often substituted and this without any increase in pressure aggrivated the foliage injury. The spread of spray material secured with the gun is determined by the whirlplate holes first and second by the pressure. The number of holes in the whrilplate influences the drive of the spray and its spread. The angle on which tthey are bored, and the taper of the holes and their size will also influence the speed, drive and quantity of material delivered. The hand adjustment gives a long reaching type of spray that is sometimes necessary in spraying the tops of very tall trees. The spray gun is a better tool under pressures that cause a fine atomized spray than under lower pressures permitting a driving type of spray that will injure foliage and fruit.

With better pressures the atomizing nozzle has been grouped into the broom type of rod, as high as six being sometimes used to advantage on a single rod. With full pressure and a small disc opening, such a collection of spray nozzles will cover a tree quickly and thoroughly with a fog of finely atomized spray material. The broom type of spray rod is not adjustable. It atomizes the spray when operating under suitable pressure, and practically eliminates application injury.

The "broom" is so efficient that many groves can be sprayed by sitting on the spray outfit and sweeping the trees as they are passed. When properly grouped they will actually reach to the tops of 30 foot trees. They will not always displace the gun for this work, as if windy the drift is difficult to control, hence the time spent in talk on discussing injury from "gun" spraying. If guns must occasionally be used their adjustment should be watched more closely.

The ideal combination from the growers standpoint is a 25-30 gallon pump that will safely reach a maximum pressure of at least 700 pounds, operating two spray rods of four nozzles each. Such an outfit would have to have a 400 gallon tank and ample power to operate at full pressure.

Power Source

Hauling a heavy load in soft going such as is found in many groves as previously pointed out takes plenty of power and exceptional tire equipment. If we add to this a power take-off for operating the spray pump the load is enormously increased. Yet because of their great

utility and ease of handling the power-take-off is here to stay.

It is true that spray rigs with their own separate engine are just as efficient and in the one point of steady power flow are superior to any form of power take-off but it is much less convenient to keep up a separate engine for spray work and haul around the added weight. In any case we must have a hauling unit that with a small amount of additional expense is capable of furnishing the power to operate the sprayer as well as for hauling it through the grove.

Trucks secure their power output through engine speed rather than through large cylinder displacement. This is referred to as torque and secures a most amazing amount of power from a comparatively small engine. There seems to be no reason why in Florida soils at least the same procedure could not be applied to tractors as well. The biggest objection to present tractor outfits is lack of mobility and the addition of too much permanent weight. In many cases models suitable for all other grove jobs lack power out-put and traction when it comes to hauling and operating the spray outfit at one and the same time.

Variation in pump speed as operated from the power take-off has not proven as serious as one would expect in the larger outfits but in the smaller pump sizes the loss of time when changing gears as reflected in spray passing through the spray nozzle is serious. A greater air pressure reserve tank would aid in overcoming this lag in pressure and give also a more even flow of liquid through the hose line with less vibration.

Road Speed

We are constantly demanding more and more of grove machinery—and getting it. Road speed or ability to travel quickly from one grove to another is an ever present consideration. After having attempted at one time to work a number of small groves located at some distance from each other I am very firmly of the opinion that only a few of the outfits of today had better ever be taken from the grove at all. A good road-speed greater than fifteen miles per hour is a necessity if an outfit is to be taken from one grove to another.

Exchange houses are today taking the lead in cooperative grove work. They are planning the extended use of the spray outfits described here for their members. There is great danger that due allowance willl not be made for the extremes of conditions under which such outfits would operate.

An inquiry among the users of high-powered large capacity outfits lines up for us the following ideas involving changes are adjustments the users felt were advisable or necessary.

The power take-off for spray pump operation is giving wonderfully efficient service. It is more satisfactory when located at the center than when offset as is the case in some tractors. With truck operation the offset on the take-off is less important as the drive does not have to allow for any free movement in getting to the pump.

Traction in the very heaviest of sandy soils needs further improvement as the trouble most frequently met with is—LACK OF ABILITY TO PULL THE SPRAY OUTFIT THRU THE SAND.

Higher pump pressures needed for increasing reserve power.

Hauling units develop insufficient power to operate pump and haul spray outfit at the same tmie. (Tractor or truck.)

Height and width of entire unit needs designing to suit the kind of grove were it will be used. (Close headed trees, seedlings, etc.)

Fuel cost need reducing. (Use of

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distilate where possible.)

In case of separate truck for the spray tank the type of wheel mounting is very important.

Time can be saved by using a separate mixing supply tank to keep sprayer supplied with material.

A gear-set on the pump is of advantage in groves where the spraying is variable or much stopping is necessary. This gives a two speed gear for the pump alone and is set at the pump so as to operate from the drivers seat.

The larger pumps require 16 horse power to operate at the required level. If a separate engine is mounted a four cylinder is always better than two or less.

CITRUS DIEBACK

(Continued from page 7)

back is due to decreased nitrification in the soil and a consequent absorption of ammonia direct by the plant; there is plenty of field evidence in Florida to bear out his theory; the next step is to prove or disprove it by laboratory studies. We should know more of the behavior of ammonia in the soil and in the tree. In the meantime we should bring our soils as near neutrality as is economically possible by the intelligent use of lime, add bulky organic matter to our very alkaline grove soils, and to our coarse sandy soils, improve drainage conditions, and avoid the more toxic forms of nitrogen where the soils are markedly distant from an optimum condition.

SOIL BACTERIOLOGY

(Continued from page 23)

tant to decay than the older hard matter. If we want quick conversion of the organic matter or ammonia fertilizater into nitrates—then it is better to harrow or plow while the crop is young, or at least knock it down. The number of bacteria per gram of soil can often be doubled in an hours time by incorporating some sugar or starch with the soil.

In the spring it is possible to increase the temperature of the soil several degrees by working in (plowing under) organic matter. This is due to the bacterial activitity and new growth of the plant can thus be hurried along at a time when the temperature of the soil would otherwise not be optimum for the start of growth.

Again, when we desire a quick growth and can incorporate into the soil some readily soluble organic matter, we can obtain a supply of nitrates from any supply if ammonia, that is, in the soil. The point here to keep in mind, and perhaps the most important in this whole paper, is the fact that it is only ammonium carbonate that nitrifying bacteria are capable of converting into nitrites and hence into nitrates. So if we have used, say, ammonium sulfate as our source of nitrogen we must have a supply of soluble carbon sulfate available for the conversion of the sulfate into carbonate. This carbon may be derived from either calcium or magnesium carbonate, (limestone) or may be derived from the disintegration of organic matter into carbon dioxide (CO_2). The first stage in the breaking down of protein is due to the bacteria that causes water to enter into the compound. In the last stage, that is, the breaking down of the amino acids or the splitting off of the amonia, additional oxygen enters into the new compounds. It is important here that this new oxygen be available from air, otherwise bacteria will split up other compounds to get their oxygen and these other compounds might be very detrimental to soil fertility. In some cases this oxygen is robbed from nitrates reducing them to the poisonous nitrites. In marshy places even the nitrites could be robbed of their oxygen and free nitrogen liberated. In this last case, the nitrogen would go into the air and be lost to us.

(Concluded next month)

FOR SALE—Selected budwood and trees of Perrine lemon, Tahiti lime, new varieties tangeloes and other citrus. Ward's Nursery, Avon Park, Fla.

CLASSIFIED Advertisments

The rate for advertisements of this nature is only five cents per word for each insertion. You may count the number of words you have, multiply it by five, and you will have the cost of the advertisement for one insertion. Multiply this by the total number of insertions desired and you will have the total cost. This rate is so low that we cannot charge classified accounts, and would, therefore, appreciate a remittance with order. No advertisement accepted for less than 50 cents.

FANCY ABAKKA pineapple plants. R. A. Saeger. Ankona, Florida.

PUREBRED PULLETS FOR SALE—White Leghorns and Anconas ready to ship. Barred Rocks and R. I. Reds shortly. Several hundred yearling White Leghorn hens now laying 70%. Write or wire for prices. C. A. Norman, Dr. 1440, Knoxville, Tenn.

LAREDO SOY BEANS, considered free from nematode, excellent for hay and soil improvement. Write the Baldwin County Seed Growers Association, Loxley, Alabama, for prices.

WANTED—To hear from owner having good farm for sale. Cash price, particulars, John Black, Chippewa Falls, Wisconsin.

BUDDED trees new Florida commercial lemon, proven, thin skinned, juicy, scab immune. Also rough lemon, sour orange and Cleopatra seed and liningout seedlings. DeSoto Nurseries, DeSoto City, Fla.

SEND no money. C. O. D. Cabbage, Onion and Collard plants. All varieties 500—60c; 1,000—95c; 5,000 and over 75c per 1,000. Standard Plant Co., Tifton, Ga.

C. O. D. Frostproof cabbage, onion and collard plants. All varieties 500—60c; 1,000—95c. Farmers Plant Co.. Tifton, Ga.

DUSTER — Niagara, Air-Cooled engine Steel truck-mounted. Nearly new. Half price. Samuel Kidder. Monticello Fla.

HIGH BLOOD PRESSURE easily, inexpensively overcome, without drugs. Send address. Dr. J. B. Stokes, Mohawk, Fla.

SEEDS—ROUGH LEMON, SOUR ORANGE, CLEOPATRA. Pure, fresh, good germination. Also seedlings lineout size. De Soto Nurseries, DeSoto City, Fla.

DETAILED SOIL Analysis, Interpretations. $2.50. Soil Laboratory, Frostproof, Florida.

RAISE PIGEONS—Profit and pleasure. Illustrated descriptive catalogue postage six cents. Vrana Farms, Box 314a, Clayton, Missouri.

CROTALARIA SPECTABILIS—Seed for sale. New crop, well cured, bright and clean. Price 25c per pound in 100 pound lots and over, 30c per pound in less quantities, f. o. b. Hastings, Bunnell, Lowell and San Antonio, Florida. F. M. LEONARD & COMPANY, Hastings, Florida.

SCENIC HIGHWAY NURSERIES has a large stock of early and late grapefruit and oranges. One, two and three year buds. This nursery has been operated since 1883 by G. H. Gibbons, Waverly, Fla.

CABBAGE, Onion and Collard plants. All varieties now ready. Postpaid 500 for $1.00; 1000 $1.50. Expressed $1.00 per 1,000; 5,000 and over 75c per 1,000. Satisfaction guaranteed. P. D. Fulwood, Tifton, Ga.

NEW COMMERCIAL lemon for Florida, the Perrine; proven. All residents need yard trees, keeping Florida money at home. Booking orders for budded stock for Winter delivery. DeSoto Nurseries, DeSoto City, Fla.

WANTED—To hear from owner of land for sale. O. Hawley, Baldwin, Wis.

SATSUMA BUDWOOD from Bearing Trees. Hills Fruit Farm, Panama City, Fla.

SEED—Rough lemon, sour orange, cleopatra. New crop from type true parent trees. Also thrifty seedlings. DeSoto Nurseries, De Soto City, Florida.

Shipping Departments

For Sale—One used "Marsh" Stencil Cutting Machine; cuts half-inch letters. Also have ink pot, brush and liberal supply of blank stencils. Machine guaranteed in best of condition and to operate in every way comparable with a new machine.

Price, complete with accessories as listed, f.o.b. Tampa, $50.

THE DURO CO.
1219 Florida Ave., Tampa, Fla.